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HAIR COMPOSITIONS COMPRISING AT LEAST ONE ADHESIVE POLYMER AND SOLID PARTICLES

The invention relates to hair compositions comprising, in a cosmetically acceptable medium, at least one adhesive polymer and particles. The invention is also directed toward a cosmetic process comprising the use of this composition, and also to its use for manufacturing a cosmetic hair formulation.

For the purposes of the present invention, the expression "styling product" means a product intended to hold and/or fix the shape of the hairstyle.

Products intended to give the hair certain esthetic effects, such as coloring, sheen, conditioning or styling effects, are known. The products currently used are based on the use of molecules that are dissolved or in emulsion or dispersion in a cosmetic solvent. Among the emulsions or dispersions that may be mentioned are latices, which are polymers in dispersion.

It is moreover well known that certain cosmetic effects such as a make-up effect may be obtained by using solid particles. Thus, pigments are used to give color to lipsticks, nail varnishes or mascaras.

Such particles are hardly ever used in hair cosmetics,

since they produce an unpleasant, coarse feel. Furthermore, the particles deposited on the hair do not remain attached to the fibers. It is observed that they become detached from the hair with the least contact, for example by passing a hand through the hair. Gravity alone can also detach the particles. The consequences are disastrous, since the desired cosmetic effect is transient on the one hand, and the particles may stain the hands or clothing on the other hand, which is particularly unwelcome if they are colored or shiny.

Research efforts have made it possible to solve some of these problems. The best solution to date consists in combining the particles with fatty substances. The particles no longer fall under their own rate. However, they are still easy to detach from the fiber by friction, and problems arise associated with the use of fatty substances, such as poor cosmetic properties, a lank feel and a dirty appearance.

Efforts have been made to combine particles with polymers such as those commonly used in hair lacquers. However, such combinations do not make it possible to solve the problems mentioned above.

The Applicant has discovered, surprisingly and unexpectedly, that when solid particles are combined with certain polymers having a particular adhesive power, it

is possible to obtain cosmetic hair compositions that satisfy the requirements mentioned above.

One subject of the invention is a cosmetic hair composition comprising solid particles in a cosmetically acceptable medium, characterized in that it also comprises at least one adhesive polymer chosen such that the material resulting from the drying of this or these adhesive polymer(s) in the cosmetically acceptable medium has a detachment profile defined by at least one maximum detachment force F_{max} of greater than 1 N.

Another subject of the invention relates to a cosmetic hair process, characterized in that such a composition is applied to the hair.

Yet another subject of the invention relates to the use of such a composition in the manufacture of a styling, coloring, sheen or conditioning composition for the hair, and also to cosmetic hair products comprising this composition.

The preferred adhesive polymers are chosen such that the material resulting from the drying of this or these adhesive polymer(s) in the cosmetically acceptable medium has a glass transition temperature (Tg) of less than +10°C and has a detachment profile defined by at least:

(a) a maximum detachment force F_{max} > 1 newton, and

(b) when said temperature Tg is less than -15°C, by a separation energy $E_{(M/V)}$ of the material placed in contact with a glass surface, of less than 300 μJ.

The adhesive polymer toward which the present invention is particularly directed is the branched sulfonic polymer AQ 1350 sold by the company Eastman AQ1350. This polymer AQ 1350 is defined by:

- a Tg of 0°C
- a maximum detachment force F_{max} equal to 23 newtons.

According to the present invention, the expression "maximum detachment force F_{max}" means the maximum tensile force, measured using an extensometer, needed to detach the 38 mm^2 surfaces of two respective rigid, inert, nonabsorbent supports (A) and (B), placed facing each other; said surfaces being precoated with a formulation consisting of the adhesive polymer(s) in the cosmetically acceptable medium, at a rate of 53/c $\mu g/mm^2$, dried for 24 hours at 22°C, under a relative humidity of 50%, and then subjected for 20 seconds to a compression of 3 newtons and finally subjected for 30 seconds to a tension at a speed of 20 mm/minute, c being the concentration of solids in the formulation consisting of the adhesive polymer(s) in the cosmetically acceptable medium, expressed in grams per gram of

composition.

Preferably, the supports (A) and (B) used consist of polyethylene, polypropylene, metal alloy or glass.

The maximum detachment force F_{max} is preferentially greater than 2.5 N.

Advantageously, the ratio of the relative weight concentrations between the adhesive polymer(s) and the solid particles in the cosmetic hair composition is between 0.05 and 50 and preferentially between 0.15 and 5.

According to one preferred embodiment of the invention, the adhesive polymers have a glass transition temperature of less than 10°C.

According to the present invention, the expression "separation energy $E_{(M/V)}$, the energy supplied by the extensometer to separate 38 mm^2 surfaces of two respective rigid, inert, nonabsorbent supports (C) and (D) placed facing each other, one of said supports consisting of polished glass and the other of said supports being of identical nature to the supports (A) and (B) defined above and whose surface is coated with the formulation of solids concentration c, at a rate of $53/c$ $\mu g/mm^2$ on the support, dried for 24 hours at 22°C

under a relative humidity of 50%; the two surfaces of said supports (C) and (D) then being subjected for 20 seconds to a compression of 3 newtons and finally subjected for 30 seconds to a tension at a speed of 20 mm/minute, c being the concentration of solids in the formulation, in grams per gram of composition.

This energy supplied by the extensometer is the energy calculated by means of the following formula:

$$\int_{Xs1 - 0.05}^{Xs2} F(x)\,dx$$

in which F(x) is the force required to produce a displacement (x);

X_{s1} is the displacement (expressed in millimeters) produced by the maximum tensile force;

X_{s2} is the displacement (expressed in millimeters) produced by the tensile force that allows the total separation of the two surfaces of the supports (C) and (D) defined above.

According to the invention, flakes, platelets, leaflets, fibrils or powders are preferably used as solid particle. The particles may be organic or mineral or may consist of organic and mineral components. Mention may be made, for example, of melanin or pigments, especially synthetic pigments, derived from the polymerization of indole or indoline compounds, for

instance 5,6-dihydroxyindole or 5,6-dihydroxyindoline.

The pigments in accordance with the invention are chosen from all the organic or mineral pigments that do not result from the oxidative polymerization of cosmetically or dermatologically acceptable indole compounds.

They may be in the form of pigmentary paste or powder.

Among the mineral pigments that may be mentioned, for example, are titanium dioxide (rutile or anatase) that is optionally surface-treated, classified in the Color Index under the reference CI77891; black, yellow red and brown iron oxides, classified under the references CI77499, 77492 and 77491; manganese violet (CI77742); ultramarine blue (CI77007); hydrated chromium oxide (CI77289); ferric blue (CI77510).

Among the organic pigments that may be mentioned, for example, are the pigment Yellow 3 sold in particular under the trade name "Jaune Covanor W 1603" by the company Wackherr (CI 17710), "D & C Red No. 19" (CI 45170), "D & C Red No. 9" (CI 15585), "D & C Red No. 21" (CI 45380), "D & C Orange No. 4" (CI 15510), "D & C Orange No. 5" (CI 45370), "D & C Red No. 27" (CI 45410), "D & C Red No. 13" (CI 15630), "D & C Red No. 7" (CI 15850-1), "D & C Red No. 6" (CI 15850-2), "D

& C Yellow No. 5" (CI 19140), "D & C Red No. 36" (CI 12085), "D & C Orange No. 10" (CI 45425), "D & C Yellow No. 6" (CI 15985), "D & C Red No. 30" (CI 73360), "D & C Red No. 3" (CI 45430), carbon black (CI 77266) and lakes based on cochineal carmine (CI 75470).

It is also possible to use nacreous pigments, which may be chosen in particular from white nacreous pigments such as mica coated with titanium oxide or bismuth oxide; colored nacreous pigments such as titanium mica with iron oxides, titanium mica with ferric blue or with chromium oxide, titanium mica with an organic pigment of the abovementioned type, and also those based on bismuth oxychloride.

Pigmentary pastes of an organic pigment that are used more particularly are those such as the products sold by the company Hoechst under the name:

Jaune Cosmenyl 10G	:	Yellow 3 Pigment (CI 11710)
Jaune Cosmenyl G	:	Yellow 1 Pigment (CI 11680)
Orange Cosmenyl GR	:	Orange 43 Pigment (CI 71105)
Rouge Cosmenyl R^c	:	Red 4 Pigment (CI 12085)
Carmin Cosmenyl FB	:	Red 5 Pigment (CI 12490)
Violet Cosmenyl RL	:	Violet 23 Pigment (CI 51319)
Bleu Cosmenyl A2R	:	Blue 15.1 Pigment (CI 74260)
Vert Cosmenyl GG	:	Green 7 Pigment (CI 74260)
Noir Cosmenyl R	:	Black 7 Pigment (CI 77266)

The particles advantageously have a size of less than 1 mm, and preferably a size of less than 100 μm or even more preferentially a size of less than 30 μm.

For the purposes of the present invention, the expression "particle size" means the maximum dimension that it is possible to measure between two opposite points on the particle. The size may be determined by electron microscopy.

The particles may give rise to various cosmetic effects, for example:

- effects resulting from the interaction with light: coloring, shiny, sparkling, light-scattering, diffracting, screening or matt effect,
- mechanical or physicochemical effects: fiber-reinforcing effect, welding effect between close fibers, softening effect, antiwetting effect, effect limiting the uptake of water by humidity or washing.

In the compositions according to the invention, the relative weight concentration of adhesive polymer is preferably between 0.05% and 30%, more preferentially between 0.1% and 20% and even more preferentially between 0.2% and 10%. The relative weight concentration of solid particles is preferably between 0.1% and 50%,

more preferentially between 0.5% and 40% and even more preferentially between 1% and 25%.

The compositions in accordance with the invention preferably contain an organic solvent chosen from the group comprising C_1 to C_4 alcohols such as ethanol or isopropanol, C_5 to C_{10} alkanes, acetone, methyl ethyl ketone, methyl acetate, butyl acetate, ethyl acetate, dimethoxyethane and diethoxyethane, and mixtures thereof.

They may also contain common cosmetic additives chosen from reducing agents, for instance thiols, silanes, for instance aminopropyltriethoxysilane, fatty substances, thickeners, softeners, antifoams, moisturizers, anti-perspirants, basifying agents, colorants, fragrances, preserving agents, surfactants, fixing or nonfixing polymers, volatile or nonvolatile silicones, especially anionic silicones, polyols, proteins and vitamins.

The compositions in accordance with the invention may be packaged in various forms, especially in an aerosol device.

The invention may be understood more clearly with the aid of the nonlimiting examples which follow and which constitute preferential embodiments of the process in accordance with the invention.

In the examples, the percentages are expressed on a weight basis.

EXAMPLES

Example 1: Formulations containing leaflets

A composition in accordance with the invention containing solid particles and an adhesive polymer defined by a maximum detachment force of greater than 1 N, and compositions not in accordance with the invention containing the same solid particles but without an adhesive polymer in the sense of the invention, are compared below.

Formulation 1 (invention):

AQ 1350 (Eastman Kodak)		4 g
Reflective leaflets[2]		5 g
Jaguar HP 60[1]		1 g
Demineralized water	qs	100 g

(1): hydroxypropyl guar sold by Rhodia Chimie

(2): sold under the name Timiron Color Violet by Merck

Formulation 2 (prior art):

Reflective leaflets[(2)]		5 g
Jaguar HP 60[(1)]		1 g
Demineralized water	qs	100 g

Formulation 3 (prior art):

Reflective leaflets[(2)]		5 g
Glycerol		4 g
Demineralized water	qs	100 g

The three formulations are applied to locks of natural chestnut-colored hair at a rate of 1 g of formulation per 5 g of hair. The locks are left to stand for 30 seconds. The quality of the three locks is then evaluated.

It is observed that the locks treated with formulation 1 have, unlike the lock treated with formulation 3, a natural, soft feel. The lock treated with formulation 3 has a greasy, unpleasant feel. It is also observed that the leaflets of the lock treated with formulation 1 withstand movements better than the leaflets of the other locks treated with compositions 2 and 3.

Example 2: Formulation containing pigments

Formulation 4 below in accordance with the present invention is prepared.

Formulation 4 (invention):

AQ 1350 (Eastman Kodak)		5 g
Pigment(3)		5 g
Jaguar HP 60(1)		1 g
Demineralized water	qs	100 g

(3): sold by Kohnstamm under the name Ultramarine Blue A 4575

Formulation 4 is applied to a lock of natural gray hair (containing 90% white hairs) at a rate of 1 g of formulation per 5 g of hair. The lock is left to stand for 30 seconds. The quality of the lock is then evaluated.

It is observed that the lock treated with formulation 4 has a natural, soft feel. It is also observed that the blue coloration obtained is very resistant to the movements of the lock and shows very good resistance in the case of friction.